

REMARKS

In the Office Action, claims 1-8, 22-35, and 43-55 were rejected. By this response, claims 44 and 51 have been amended. Claims 1-8, 22-35, and 43-55 are currently pending in the present application. Reconsideration of the rejections and allowance of the pending claims are respectfully requested.

First Rejection Under 35 U.S.C. § 103

Claims 1, 2, 4-7, 22-25, 27, 28 and 43 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Watanabe, JP 2000-192135, in view of Ulrich et al.(hereinafter "Ulrich"), U.S. Patent No. 6,229,126. Applicants respectfully traverse the rejection.

Independent Claim 1

Independent claim 1 is patentable because the Watanabe and Ulrich references do not disclose or suggest all of the recited features of the claims and because there is no suggestion in the prior art to combine the references. The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). If the Examiner combines the teachings of the prior art to produce the claimed invention, a *prima facie* case of obviousness cannot be established absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985).

Independent claim 1 recites the following:

1. A portable induction heating system, comprising:
 - a power source;
 - a fluid cooling unit operable to provide a flow of cooling fluid;
 - a flexible fluid-cooled induction heating device that is electrically coupleable to the power source and fluidically coupleable to the fluid cooling unit;
 - a system controller operable to control operation of the induction heating system; and
 - a flow switch that is electrically coupled to the system controller and operable to sense the flow of cooling fluid,wherein the system controller controls operation of at least one of the power source and the fluid cooling unit to prevent heat damage to the flexible fluid-cooled induction heating device when the flow of cooling fluid through the flow switch is below a desired flow rate.

One of the recited features of independent claim 1 that is not disclosed or suggested by the Watanabe and Ulrich references is “a *flexible fluid-cooled* induction heating device that is electrically coupleable to the power source and fluidically coupleable to the fluid cooling unit.” The Watanabe reference discloses induction coils (100C, 101C, and 102C). However, the Watanabe reference does not disclose or suggest that the induction coils (100C, 101C, and 102C) are flexible.

The Examiner admitted in the Office Action that the Watanabe reference does not disclose that the induction coils (100C, 101C, and 102C) are flexible. However, the Examiner further stated that: “Ulrich shows that it is well known in the art of induction heating system for hardening of metals, brazing, soldering, or curing to use a *flexible inductor 103* to heat the object so that one coil could be used to heat different parts of various sizes and shapes (see Figures 1-3 and col. 3, line 4-col. 4, line 3).” (Emphasis added). The Examiner also stated that: “It would have been obvious to one of ordinary skill in the art to modify Watanabe to use a flexible

inductor for its induction hardening system so that the coil can be adapted for objects of different shapes and sizes, in view of the teaching of Ulrich.”

However, the flexible inductor 103 of Ulrich is not “fluid-cooled.” Furthermore, the flexible inductor 103 simply cannot be combined with the induction coils (100C, 101C, and 102C) of Watanabe to produce “a *flexible fluid-cooled* induction heating device,” as recited in claim 1. In addition, the Examiner has not suggested how one would produce a *flexible fluid-cooled* induction heating device from a combination of the induction coils (100C, 101C, and 102C) of Watanabe and the flexible inductor 103 of Ulrich. Therefore, the cited references do not disclose or suggest all of the recited features of independent claim 1.

Accordingly, claim 1 is patentable over the cited references because the cited references do not disclose or suggest all of the recited features of the claim. Withdrawal of the rejection is respectfully requested.

Furthermore, there is no suggestion in the prior art to combine the references. The Watanabe reference discloses a system comprising induction coils (100C, 101C, and 102C) that are used for surface hardening. As noted above, the Ulrich reference discloses a flexible inductor 103. However, the Ulrich reference discloses that the flexible inductor 103 of Ulrich is used for pre-heating prior to welding and for curing a varnish coating, not for surface hardening, brazing, or soldering. *See* Ulrich, col. 3, lines 4-10. Thus, contrary to the Examiner’s assertion, the Ulrich reference does not show “that it is well known in the art of induction heating system for *hardening of metals*, brazing, soldering, or curing to use a flexible inductor 103 to heat the object so that one coil could be used to heat different parts of various sizes and shapes.” Thus, there is no suggestion in either the Ulrich or the Watanabe reference that a flexible inductor 103 would be desirable for a surface hardening system, such as described in the Watanabe reference. Therefore, the cited references do not provide any motivation for combining the Watanabe and Ulrich references.

Accordingly, claim 1 is patentable over the cited references because there is no motivation in the prior art to combine the references. Claims 2, 4-7, and 43 depend from independent claim 1. If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Therefore, claims 2, 4-7, and 43 also are patentable over the cited references.

Independent Claims 22 and 27

Similarly to independent claim 1, the cited references fail to disclose or suggest all of the recited features of independent claims 22 and 27. For example, independent claim 22 recites a method of operating a portable fluid-cooled induction heating system...comprising: “routing a *flexible fluid-cooled* induction heating apparatus around a work piece.” In addition, the Watanabe reference also fails to disclose a method of assembling a portable induction heating system at a worksite, comprising: “wrapping a *flexible fluid-cooled* induction heating cable around a work piece,” as claimed in independent claim 29.

As noted above, the flexible inductor 103 of Ulrich is flexible, but not fluid-cooled. In contrast, the induction coils (100C, 101C, and 102C) of Watanabe are fluid-cooled, but not flexible. Neither reference discloses or suggests “a *flexible fluid-cooled* induction heating device,” as recited in claims 22 and 27. Thus, the cited references cannot disclose or suggest “routing a *flexible fluid-cooled* induction heating apparatus around a work piece” or “wrapping a *flexible fluid-cooled* induction heating cable around a work piece,” as recited in claims 22 and 27, respectively. Therefore, the cited references do not disclose or suggest all of the recited features of independent claims 22 and 27.

Accordingly, Applicants respectfully submit that claims 22 and 27 are patentable over the Watanabe and Ulrich references. Claims 23, 24, 25, and 28 depend from claims 22 and 27, respectively. Therefore, claims 23, 24, 25, and 28 also are patentable over the Watanabe and Ulrich references.

For all of these reasons, claims 1, 2, 4-7, 22-25, 27, 29-34 and 43 are patentable over the Watanabe and Ulrich references. Withdrawal of the rejection and allowance of the claims are respectfully requested.

Second Rejection Under 35 U.S.C. § 103

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Watanabe, in view of Ulrich, as applied to claims 1, 2, 4-7, 22-25, 27, 28 and 43, and further in view of Forster, U.S. Patent No. 3,873,830. Applicants respectfully traverse the rejection.

Claim 3 is patentable because the cited references, either alone or in combination, fail to disclose or suggest all of the recited features of the claim. In addition, claim 3 is patentable because there is no suggestion in the prior art to combine the references. Claim 3 depends from independent claim 1. For the reasons provided above, the Watanabe and Ulrich references do not disclose or suggest all of the recited features of claim 1. Furthermore, the Forster reference also fails to disclose the missing subject matter of claim 1 that is not disclosed by the Watanabe and Ulrich references.

In the Office Action, the Examiner stated that: "...Forster teaches an induction heating system with an operating condition sensing device to provides (sic) an alarm signal and such signal can be used to shut down the welding apparatus to initiate suitable control measures (see Figures 1 and 2 and col. 6, lines 9-62)." However, contrary to the Examiner's assertion, the Forster reference does not disclose an induction heating system. In fact, the Forster reference is directed to a welding system, not an induction heating system. In particular, the Forster reference discloses an apparatus for determining the temperature of a weld seam. *See* Forster, col. 3, lines 59-61. There is nothing in the Forster reference to suggest that it describes an induction heating system. Furthermore, there is nothing in the Forster reference that discloses or suggests that the apparatus controls an induction heating system.

Thus, not only does the Forster reference fail to disclose the missing recited features of claims 1 and 3, but there is nothing in the Forster reference to suggest combining the Forster reference with the Watanabe and Ulrich references.

For all of these reasons, claim 3 is patentable over the cited references. Withdrawal of the rejection and allowance of claim 3 are respectfully requested.

Third Rejection Under 35 U.S.C. § 103

Claims 8 and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Watanabe, in view of Ulrich as applied to claims 1, 2, 4-7, 22-25, 27, 28 and 43, and further in view of Lerg et al. (hereinafter "Lerg"), U.S. Patent No. 6,288,643. Applicants respectfully traverse the rejection.

Claims 8 and 26 are patentable because the cited references, either alone or in combination, fail to disclose or suggest all of the recited features of the claims. Furthermore, the claims are patentable because there is no suggestion in the prior art to combine the references. Claim 8 depends from independent claim 1 and claim 26 depends from independent claim 22. For the reasons provided above, the Watanabe and Ulrich references do not disclose or suggest all of the recited features of claims 1 and 22. Furthermore, the Lerg reference also fails to disclose the missing subject matter of claims 1 and 22 that are not disclosed by the Watanabe and Ulrich references.

The Lerg reference discloses a graffiti detection system 100. However, in attempting to use the Lerg reference, the Examiner is engaging in hindsight reconstruction because there is no reason to believe that one skilled in the relevant art would look to a graffiti detection system to solve a problem associated with an induction heating system. When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the

combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). Here, there is nothing in either reference to suggest the desirability of combining an alarm from the Lerg reference with the systems of the Watanabe and Ulrich references.

For all of these reasons, claims 8 and 26 are patentable over the cited references. Withdrawal of the rejection and allowance of claims 8 and 26 are respectfully requested.

Fourth Rejection Under 35 U.S.C. § 103

Claims 29-34 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Jancosek et al. (hereinafter "Jancosek"), U.S. Patent No. 4,845,332, in view of Cachat, U.S. Patent No. 3,705,285, and Watanabe. Applicants respectfully traverse the rejection.

Independent claim 29 recites the following:

29. A portable induction heating system, comprising:
- a power source;
 - a fluid cooling unit operable to provide a flow of cooling fluid;
 - an induction heating device that is electrically coupleable to the power source and fluidically coupleable to the fluid cooling unit;
 - a wheeled cart adapted to transport the fluid cooling unit and the power source to a work piece;
 - a system controller operable to control operation of the power source; and
 - a flow switch that is electrically coupled to the system controller and operable to sense the flow of cooling fluid,
- wherein the system controller controls the operation of the power source to prevent power from being applied to the induction heating device when the flow of cooling fluid through the flow switch is below a desired flow rate.

One of the recited features of claim 29 that is not disclosed by the cited references is “a wheeled cart adapted to transport the fluid cooling unit and the power source to a work piece.”

In the Office Action, the Examiner stated that:

Jacosek reference discloses an induction heating system having a power source (221, 222, 223), a portable fluid cooling unit (shown in Figure 4 connected to a cooling cable 71, see col. 7, lines 33-35), an induction heating device (32), a wheeled cart 58 for the power supply and a system controller (Fig. 1A).

The Examiner also admitted that the cooling fluid unit is not on the carriage of Jacosek. Specifically, the Examiner stated that:

However, Cachat shows that it is well known in the art to carry the cooling on a wheeled carriage (see Figure 4 and col. 8, line 42-col. 9, line 12). It would have been obvious to modify Jacosek to also carry the fluid cooling unit on the carriage so that the cooling fluids can be supplied to the heating device with better control and ease, in view of Cachat.

However, contrary to the Examiner's assertion, the combination of the Jacosek and Cachat references does not disclose or suggest “a wheeled cart adapted to transport the fluid cooling unit and the power source to a work piece,” as recited in claim 29. The Jacosek reference discloses a movable frame or carriage 58. However, as the Examiner has admitted, the Jacosek reference does not disclose a fluid cooling unit on the carriage 58. Instead, the fluid cooling unit is stationary and coupled to the furnace 32 by a suitable flexible electrical supply cable and cooling water conduit 71. *See* Jacosek, col. 7, lines 33-35. Alternatively, the Cachat reference discloses a carrier 148 having a cooling fluid source 174, but connected to an external power source. *See* Jacosek, col. 8, lines 12-47. The Examiner asserts that it would be obvious to place the cooling fluid source 174 of Cachat on the carriage 58 of Jacosek. However, such a change to Jacosek would be counter to the specific configuration disclosed in the Jacosek reference. Furthermore, it is unclear how placing a cooling fluid source on the carriage 58 of Jacosek

provides any better control or ease than the existing configuration. In fact, the extra weight of the cooling fluid source would make moving the carriage more difficult to move, not less difficult.

Finally, a modification is not obvious simply because it can be made. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). Clearly, neither the system of Jacosek or the system of Cachat is meant to be moved. Thus, placing more items on the carriage 58 of Jacosek or the carrier 148 of Cachat does not benefit the users of either of these systems. In this case, the Examiner has provided no evidence from the prior art that suggests the desirability of the combination proposed by the Examiner. Instead, the motivation for the combination is being provided exclusively by the Examiner based on the Examiner's hindsight reconstruction. Similarly, even if the modification of the prior art were within the capabilities of one skilled in the art that would not be sufficient by itself to establish a *prima facie* case of obviousness. *See Ex. Parte Levengood*, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993).

For all of these reasons, independent claim 29 is patentable over the cited references. Claims 30-34 depend from independent claim 29. Therefore, claims 30-34 also are patentable over the cited references.

Fifth Rejection Under 35 U.S.C. § 103

Claim 35 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Jancosek, in view of Cachat and Watanabe, as applied to claims 29-34 above, and further in view of Lerg. Applicant respectfully traverses the rejection.

Claim 35 depends from independent claim 29. For the reasons provided above, independent claim 29 is patentable over the Jacosek, Cachat, and Watanabe references. The Lerg reference does not obviate the deficiencies of the Jacosek, Cachat, and Watanabe references in

failing to render claim 29 unpatentable. Accordingly, claim 35 also is patentable over the cited references.

Sixth and Seventh Rejections Under 35 U.S.C. § 103

Claims 51-54 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Watanabe, in view of Ogino et al. (hereinafter "Ogino"), U.S. Patent No. 4,456,807. In addition, claims 44-50 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Watanabe, in view of Ogino, as applied to claims 51-54 above, and further in view of Lerg. Amendments to independent claims 44 and 51 have been submitted with this response. Applicants respectfully traverse the rejection.

Among the recited features of independent claim 51 that are not disclosed or suggested by the cited references is: "an alarm system operable to provide an alarm when a signal representative of an improper operating condition in the induction heating power source, or a signal representative of the flow rate of the cooling fluid being below the desired flow rate, or both is received." Similarly, the cited references fail to disclose or suggest: "a communication circuit operable to transmit a *wireless* alarm signal when an improper operating condition exists in the induction heating power source, or the flow of cooling fluid, or both," as recited in independent claim 44.

In the Office Action, the Examiner stated that:

Ogino shows that it is well known in the art of induction heating systems to use alarm systems (36, 37) to notify the user when any one of many operating conditions is not proper (39-43) (see Figure 1, col. 4, lines 9-56). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Watanabe to provide alarm (sic) signal when another improper operating condition is detected in addition to a signal representative of the flow rate of the cooling fluid being below a

desired flow rate is received for better information feedback and a safe operation, in view of the teaching of Ogino.

The Ogino reference discloses an induction heating *cooking* appliance. The Watanabe reference, on the other hand, discloses a surface hardening device, not a cooking appliance. The Ogino reference does provide alarms when certain conditions exist, but none of those conditions are relevant to the induction heating system of Watanabe. Thus, there is no motivation for combining the references. For example, Ogino discloses a cooking appliance that alarms when a pan is heated with no load or an air inlet or outlet is blocked, or the pan is not centered in the heating section of the appliance. *See* Ogino, col. 4, lines 9-34. However, none of these conditions is relevant to the surface hardening induction heating system of Watanabe. Therefore, there is no reason for one skilled in the art to even refer to the Ogino reference or combine the alarm of Ogino with the system of Watanabe. The Examiner is simply picking and choosing from the references in an attempt to deprecate claim 51. However, this is improper hindsight reconstruction. Furthermore, as noted above, the possibility that some modification may be made to the references to deprecate the claim does not provide the motivation to combine the references or the claimed feature. In this case, there simply is nothing to suggest combining the Ogino reference with the Watanabe reference. Furthermore, even if the references are combined, the references do not disclose all of the recited features of the claim. Accordingly, independent claim 51 is patentable over the Watanabe and Ogino references.

Similarly, in regard to claim 44, there is no suggestion in the prior art to combine the Lerg reference with the Watanabe and Ogino references. As noted above, there is no suggestion in either the Watanabe or Ogino references to combine the references. Furthermore, there is nothing in the cited references to suggest combining the Lerg reference with the Watanabe and Ogino references. The Lerg reference discloses a graffiti detection system, not an induction heating system. The Lerg reference does disclose various alarms, but that is not reason enough to combine the references. Again, there must be something in the references to suggest the desirability of making the modification. There is nothing in any of these references that suggests

the desirability of an induction heating system having a “a communication circuit operable to transmit a *wireless* alarm signal when an improper operating condition exists in the induction heating power source, the flow of cooling fluid, or both,” as recited in independent claim 44.

Accordingly, claim 44 is patentable over the cited references. Claims 45-50 and 52-54 depend from independent claims 44 and 51, respectively. Therefore, claims 45-50 and 52-54 also are patentable over the cited references.

Eighth Rejection Under 35 U.S.C. § 103

Claim 55 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Watanabe in view of Forster. Applicant respectfully traverses the rejection.

As with the claims described above, independent claim 55 is patentable because the cited references do not disclose or suggest all of the recited features of the claim and because there is no suggestion in the prior art to combine the references. Claim 55 is recited as follows:

55. A portable induction heating system, comprising:
- an induction heating power source;
 - a fluid cooling unit operable to provide a flow of cooling fluid;
 - a fluid-cooled induction heating device that is electrically coupleable to the power source and fluidically coupleable to the fluid cooling unit;
 - a system controller operable to control operation of the induction heating system; and
 - a flow switch that is electrically coupled to the system controller and operable to sense cooling fluid flow rate,
- wherein the system controller is operable to control operation of the fluid cooling unit to increase the cooling fluid flow rate when the cooling fluid flow rate is below a desired cooling fluid flow rate.

One of the features of claim 55 that is not disclosed or suggested by the cited references is a system controller, “wherein the system controller is operable to control operation of the fluid cooling unit to *increase* the cooling fluid flow rate when the cooling fluid flow rate is below a desired cooling fluid flow rate.” Neither the Watanabe reference, which discloses a coolant system, or the Forster reference, which does not disclose a coolant system, discloses or suggests a system controller to increase fluid flow when the cooling fluid flow rate is below a desired cooling fluid flow rate.

In the Office Action, the Examiner stated, in pertinent part, that:

...Watanabe discloses the claimed invention except for increasing the cooling fluid flow rate when the cooling fluid flow rate is below a desired cooling fluid flow rate. However, controlling the operation of the cooling unit to increase flow when the flow rate is low would have been obvious to an ordinary artisan in view of Watanabe as it teaches the use of a solenoid valve and a manual bulb to adjust the flow amount of coolant (see section [0009]) in order to maintain the desired coolant flow rate to prevent overheating of the induction coils. Anyway, Forster teaches an induction heating system with an operating condition sensing device to provides (sic) an alarm signal and such signal can be used to shut down the welding apparatus or to initiate suitable control measures (see Figures 1 and 2 and col. 6, lines 9-62). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Watanabe to either shut down the complete operation or adjust the operation parameters, such as increase the flow of coolant when the detected cooling flow rate is low, in view of the teaching of Forster, depending on the seriousness of the malfunction situation. For instance, if the low coolant flow was caused by a low water pressure, obviously, the situation could be easily corrected by increase (sic) the flow rate, however, it (sic) was caused by ruptured pipes, the whole system would have to be shut down.

However, the Examiner has cited nothing from either of the two references that discloses or suggests a system controller “operable to control operation of the fluid cooling unit to *increase*

the cooling fluid flow rate when the cooling fluid flow rate is below a desired cooling fluid flow rate,” as recited in claim 55. The Examiner refers to the “*manual* bulb” of Watanabe, as being able to adjust the flow amount of coolant. However, the *manual* bulb is just that, *manual*. When the flow switch 500 provides an alarm that the flow rate of the coolant is below a set point, the *manual* bulb of Watanabe does not increase cooling fluid flow rate. Furthermore, as noted above, the Forster reference does not disclose an induction heating system or providing a flow of cooling fluid. Most importantly, the Forster reference does not disclose or suggest that “to initiate suitable control measures” means adjusting an operating parameter upward, such as increasing the flow rate, as suggested by the Examiner. In fact, the actual recitation “to shut down the welding apparatus or to initiate suitable control measures” more strongly implies a reduction in an operating parameter, such as power, rather than increasing an operating power.

In addition, the Examiner has improperly provided the motivation to combine the references, rather than the prior art. However, as noted above, there must be something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *See Uniroyal Inc.*, 837 F.2d 1044. The motivation to combine the reference cannot come from the Examiner. The Examiner appears to be making the argument that it is obvious to combine the references because they can be combined. However, this too is improper. Even if we assume that the references can be combined, “The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.” *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). In this case, the Examiner has provided no evidence that the prior art suggests the desirability of the combination. Instead, the motivation for the combination is being provided exclusively by the Examiner. Similarly, even if the modification of the prior art were within the capabilities of one skilled in the art that would not be sufficient by itself to establish a *prima facie* case of obviousness. *See Ex. Parte Levengood*, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993).


For all of these reasons, claim 55 is patentable over the Watanabe and Forster references.
Withdrawal of the rejection and allowance of claim 55 are respectfully requested.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: 9/28/04



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